ARCHANGEL:
Galaxy Photometry System

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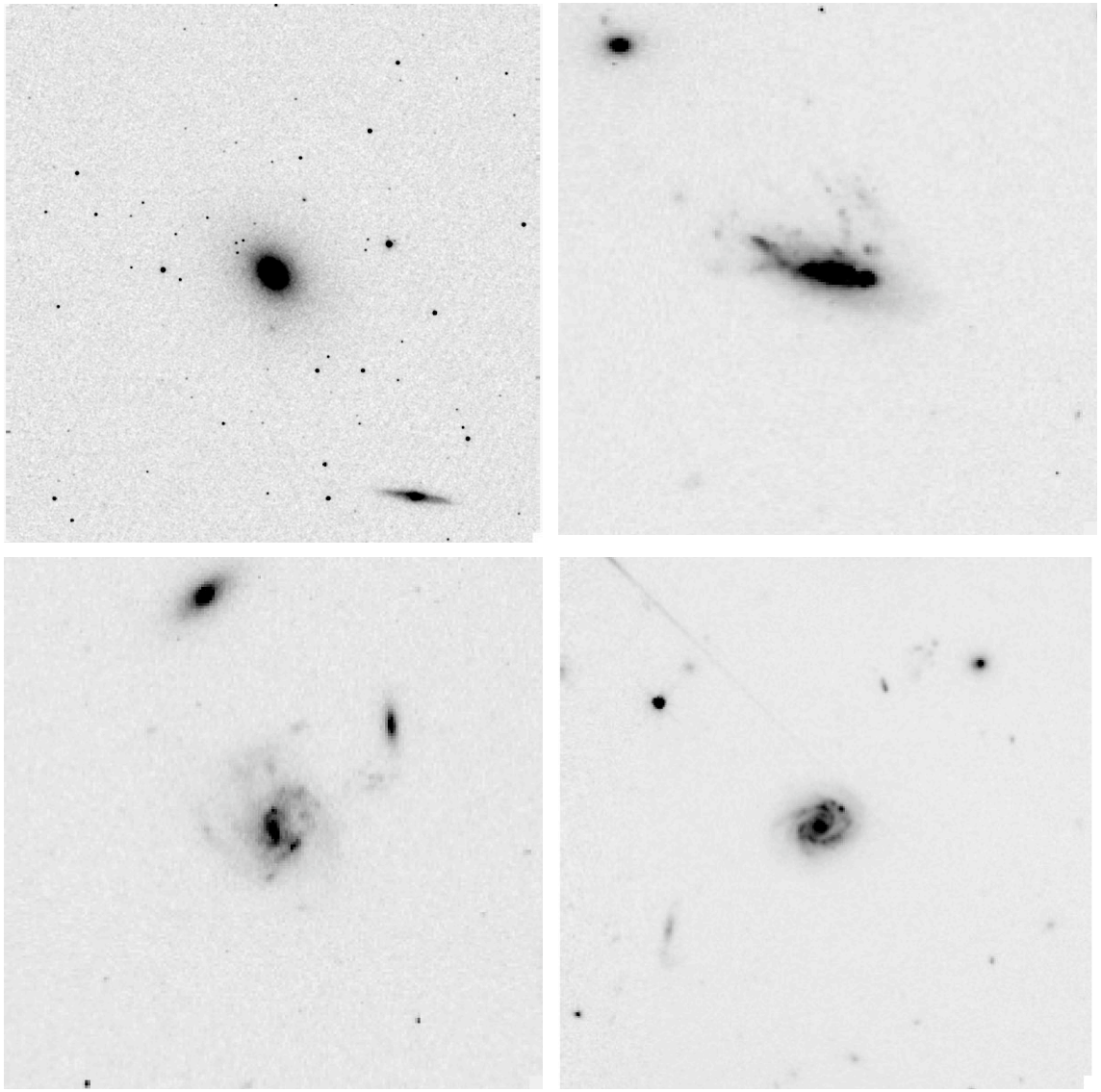
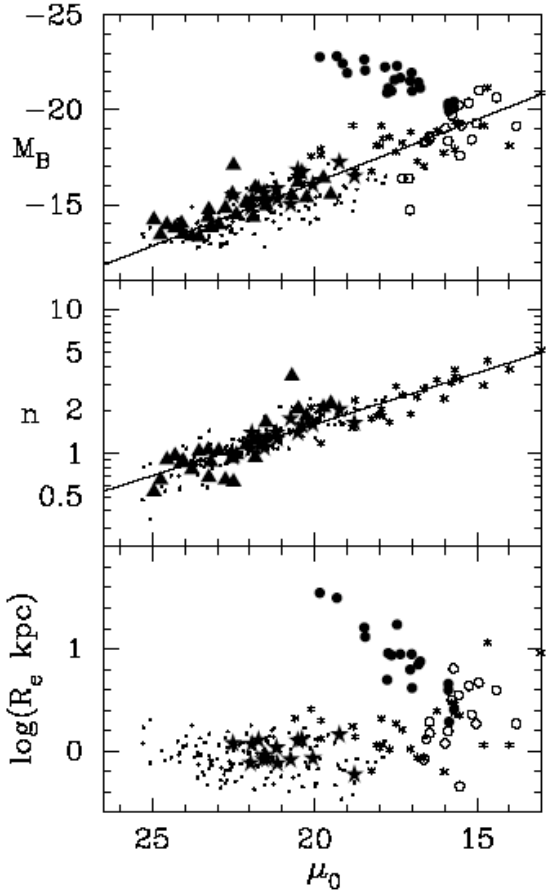
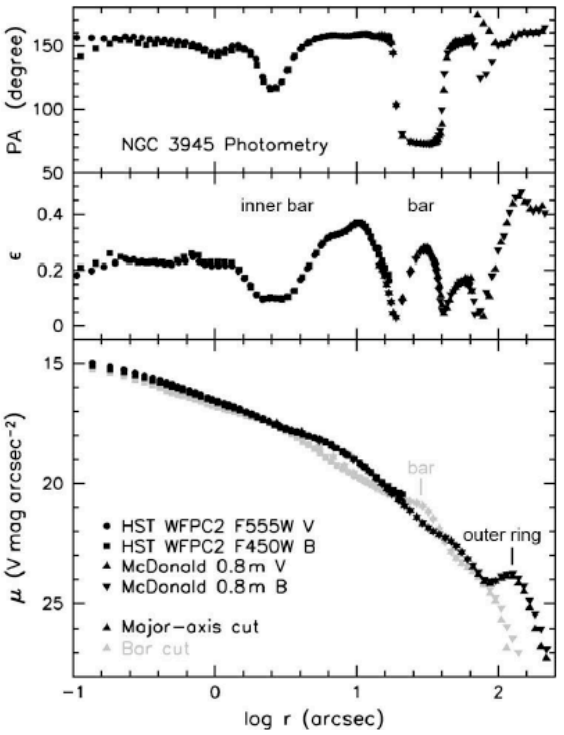
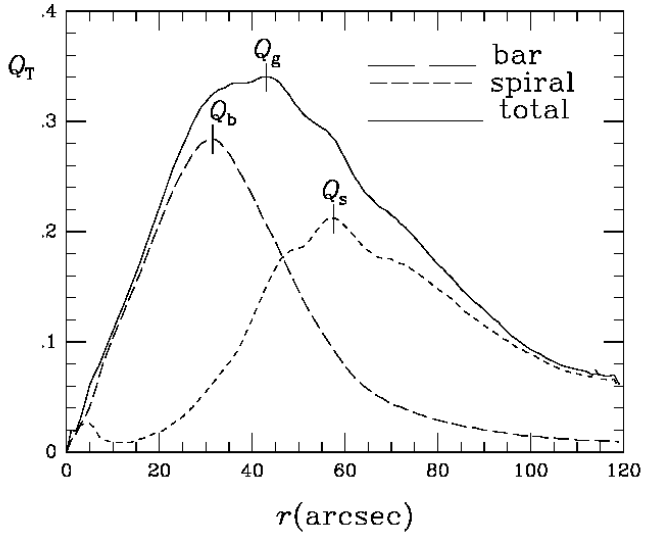
Goal: To go from these



To these:


−25
−20
−15
M_B
10
5
2
1
0.5
n
1
0
$\log(R_e$ kpc)
25
20
15
μ_0


PA (degree)
150
100
50
NGC 3945 Photometry
inner bar
bar
ε
0.4
0.2
0
15
20
25
μ (V mag arcsec⁻²)
bar
outer ring
HST WFPC2 F555W V
HST WFPC2 F450W B
McDonald 0.8m V
McDonald 0.8m B
Major−axis cut
Bar cut
−1
0
1
2
log r (arcsec)


Q_T
Q_g
Q_b
Q_s
bar
spiral
total
0
20
40
60
80
100
120
r(arcsec)

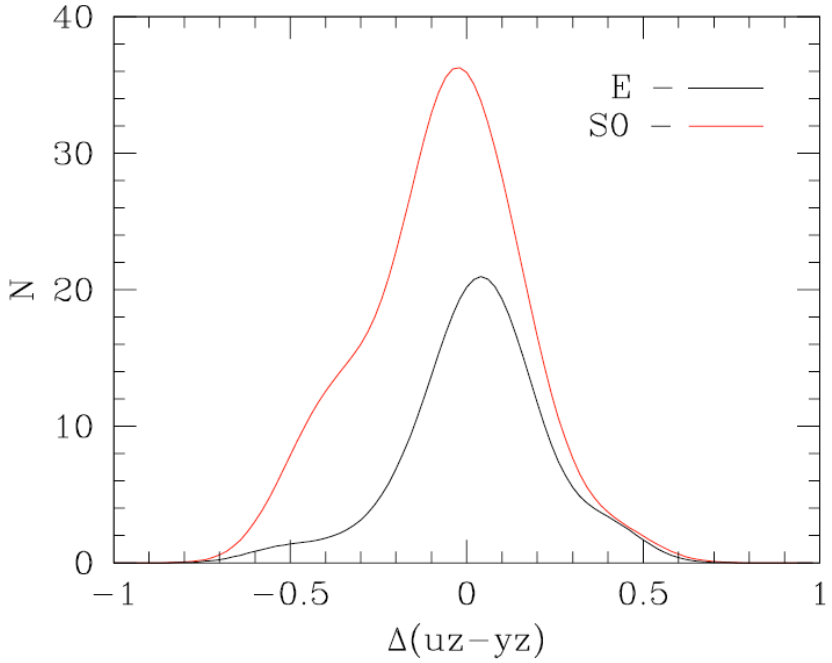
Package Features:

- Sky determination
- Iterative cleaning/artifact removal
- Aperture, isophotal, asinh mags, surface photometry
- color profiles and 2D maps
- Structural parameters, Sérsic fitting (i.e. 2D to 1D), cos 4θ components
- Quantitative morphology (concentration, asymmetry, clumpiness)

Available through web client/server interface or tarball

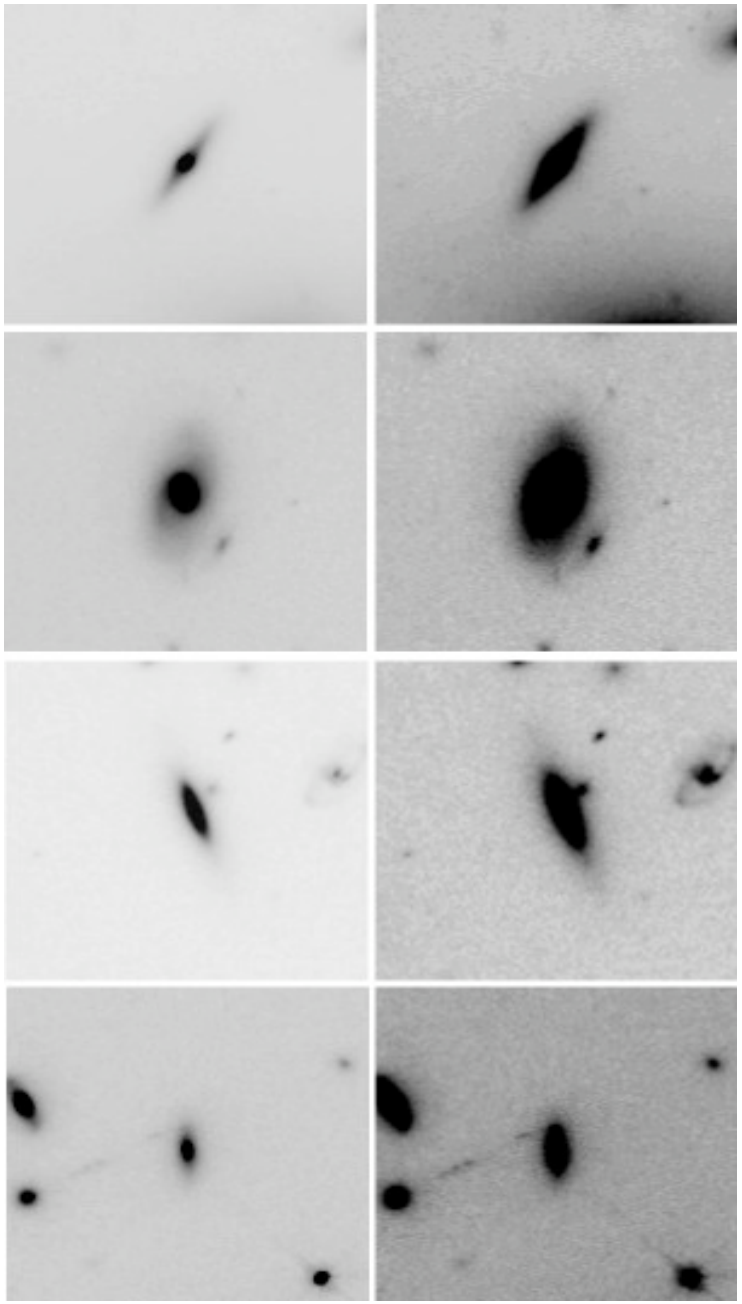
Plus:

- Catalog generator (process NED batch searches)
- Image finder - locates (interactive or batch) all available FITS files concerning objects
- Source code uses PyFits, ppgplot (Python PGPLOT)
- Play tested on Solaris, Linux, Mac OS X platforms (i.e. OS independent)

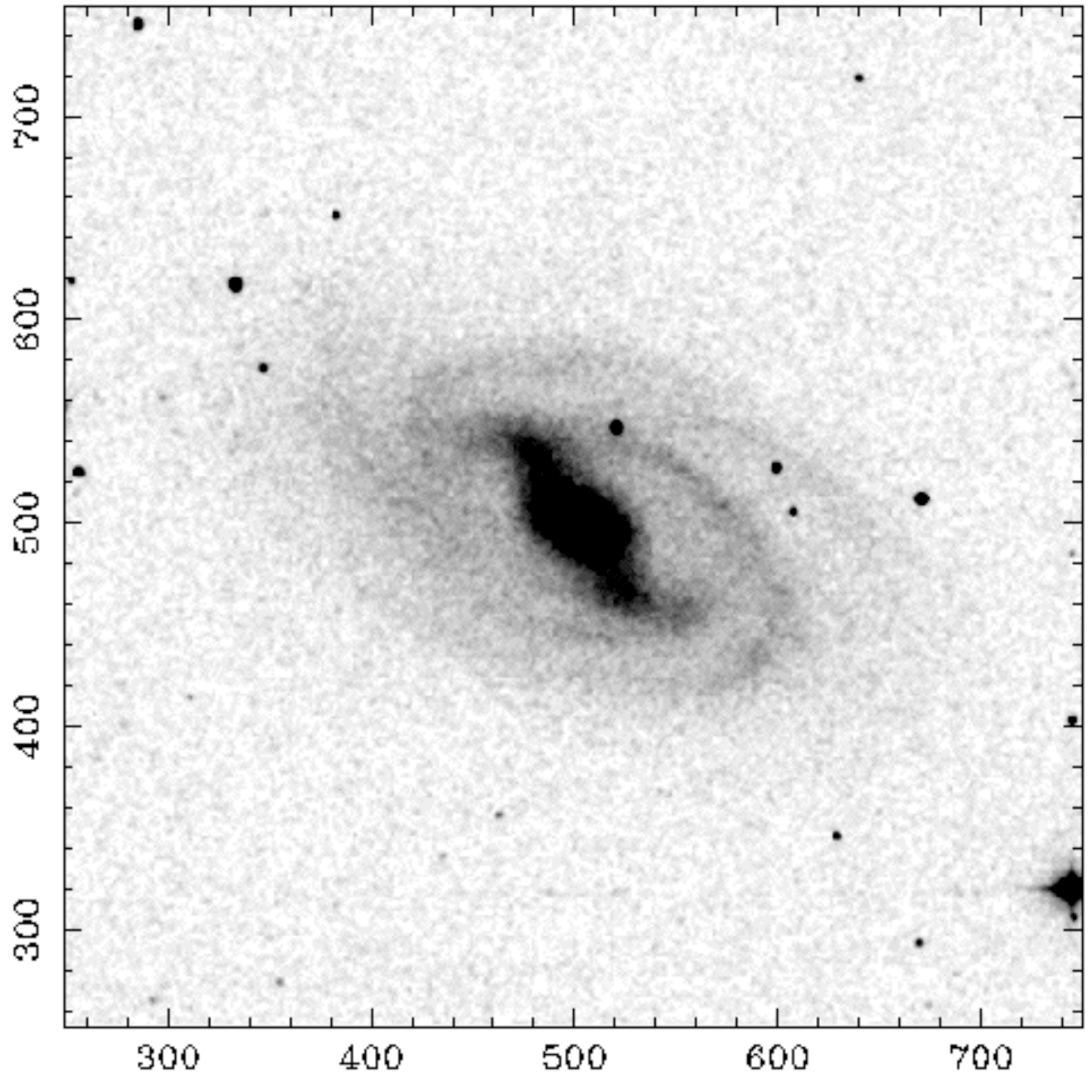


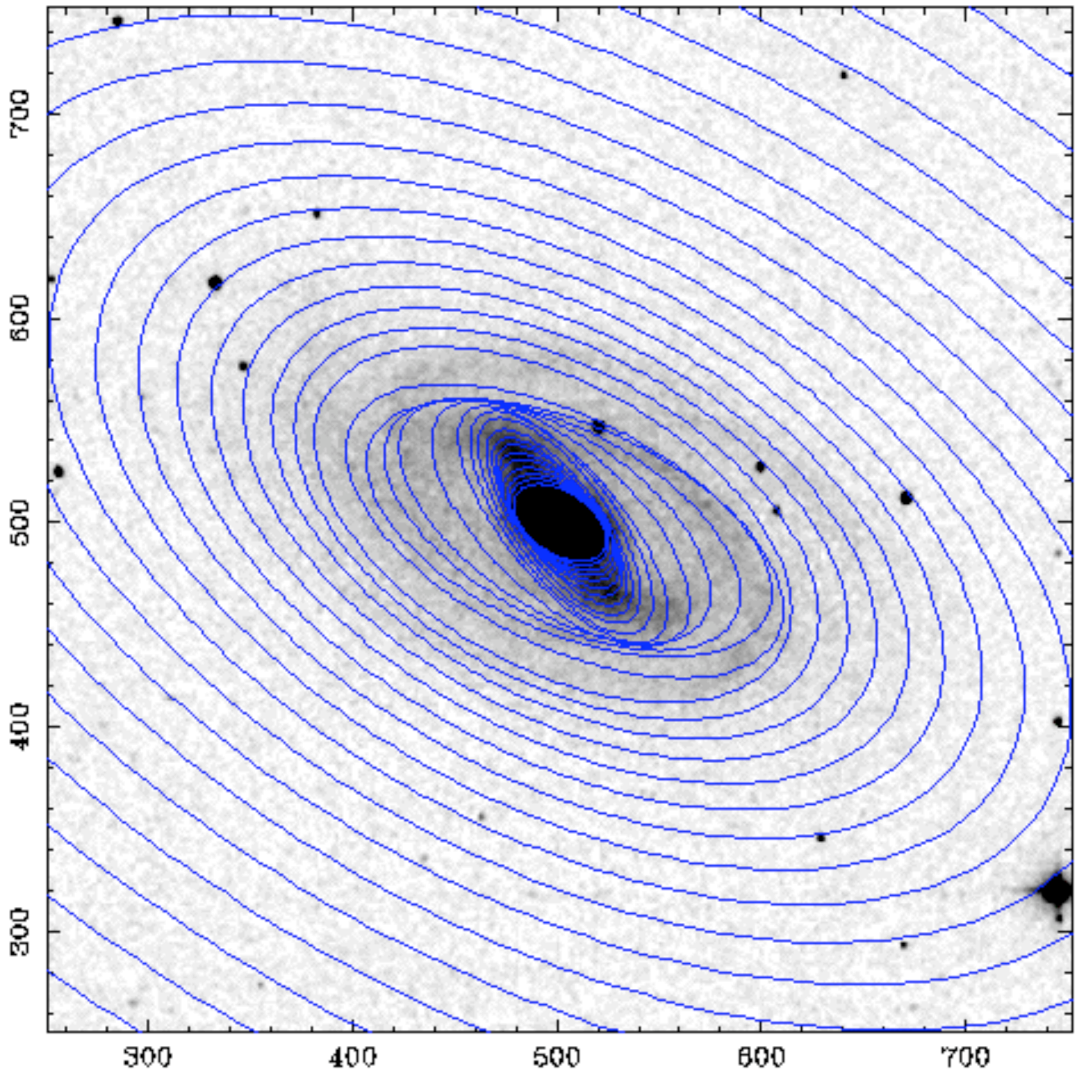
Typical science project:

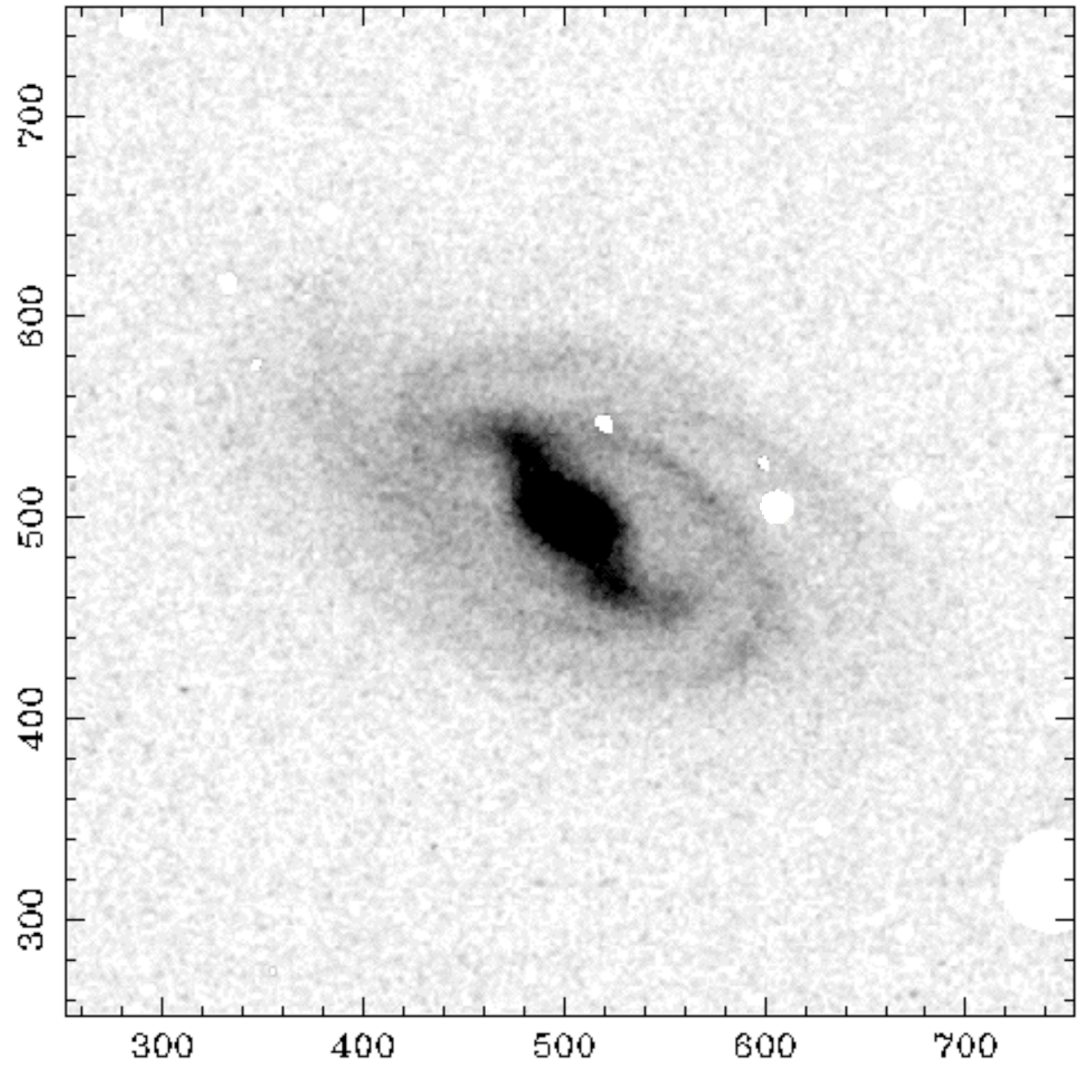
- colors of S0's versus ellipticals in rich clusters
- S0 bulge+disk versus lenticulars (pure disk)



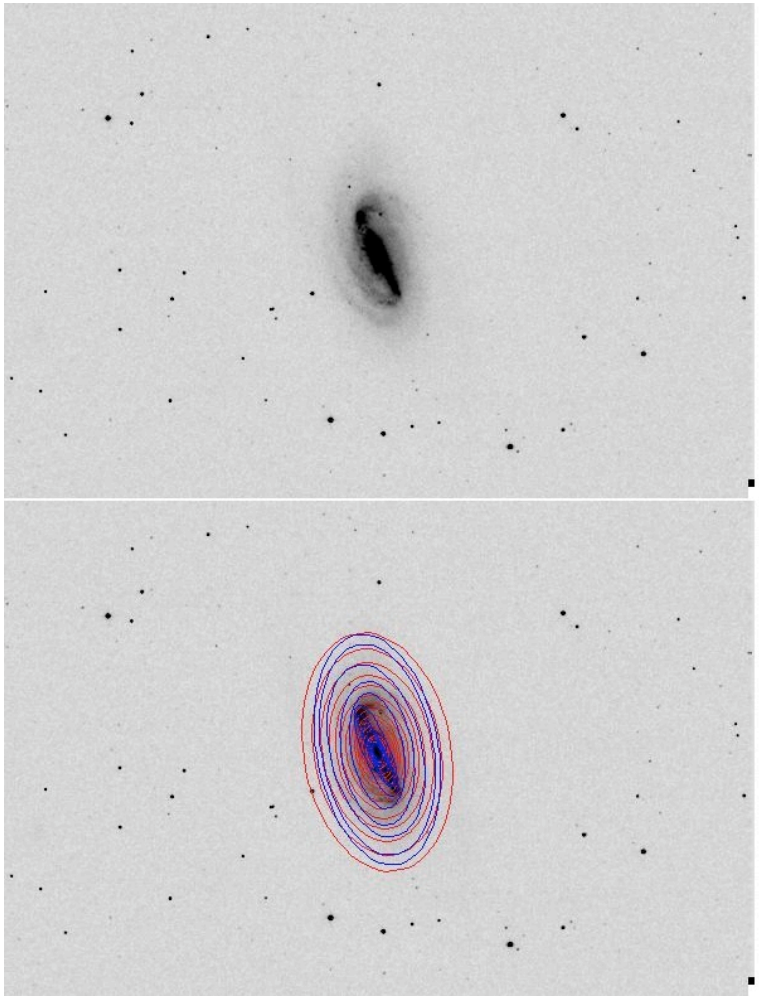
NGC 3992 [SB(rs)bc]



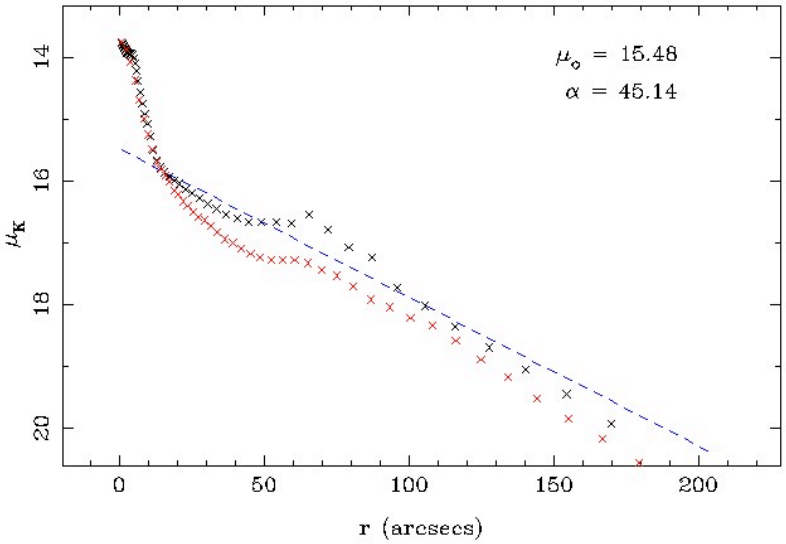

700
600
500
400
300
300
400
500
600
700


700
600
500
400
300
300
400
500
600
700

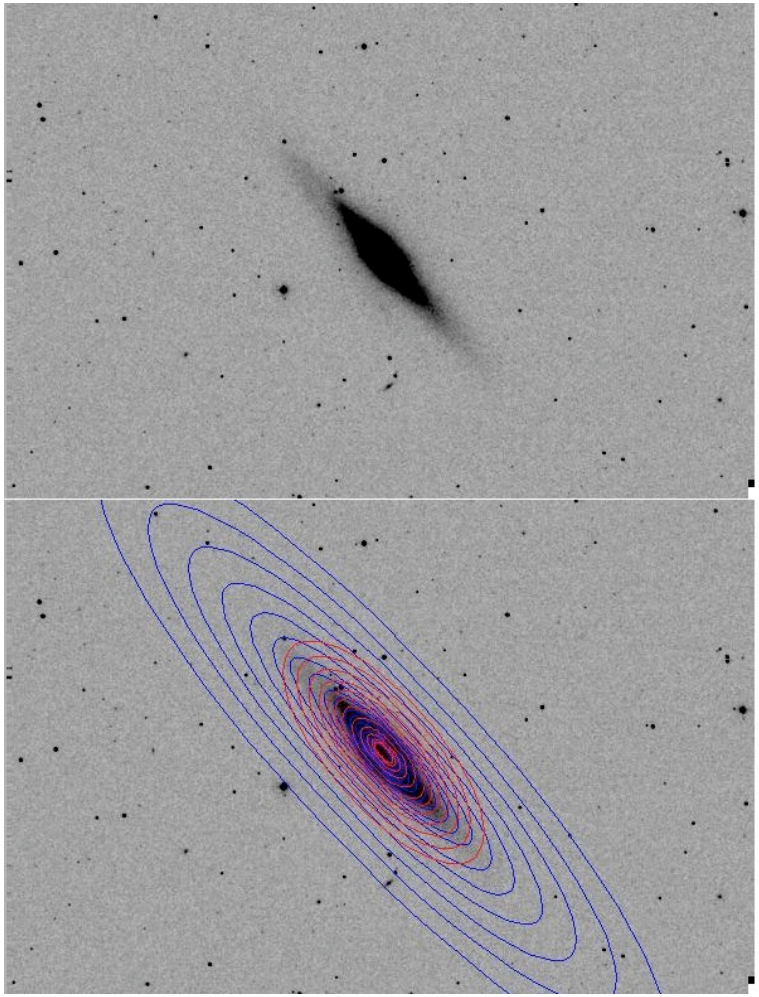
Examples: 2MASS (red) vs Archangel (blue)



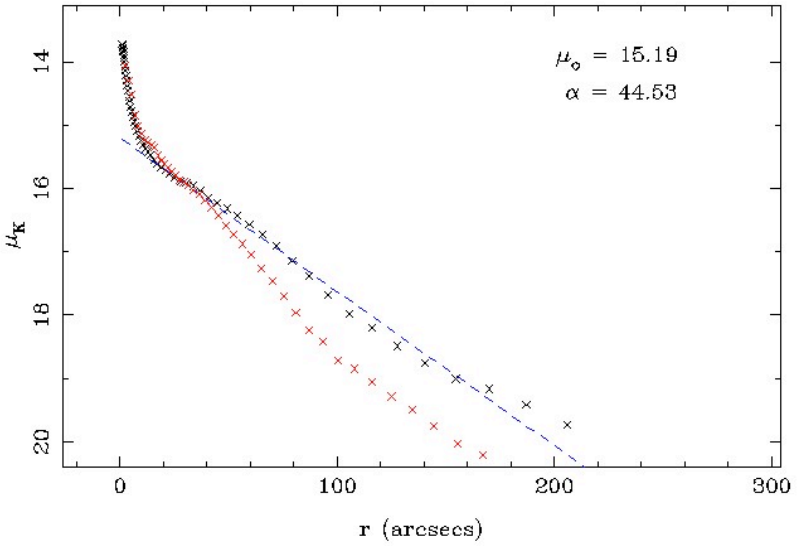
Face-on galaxy



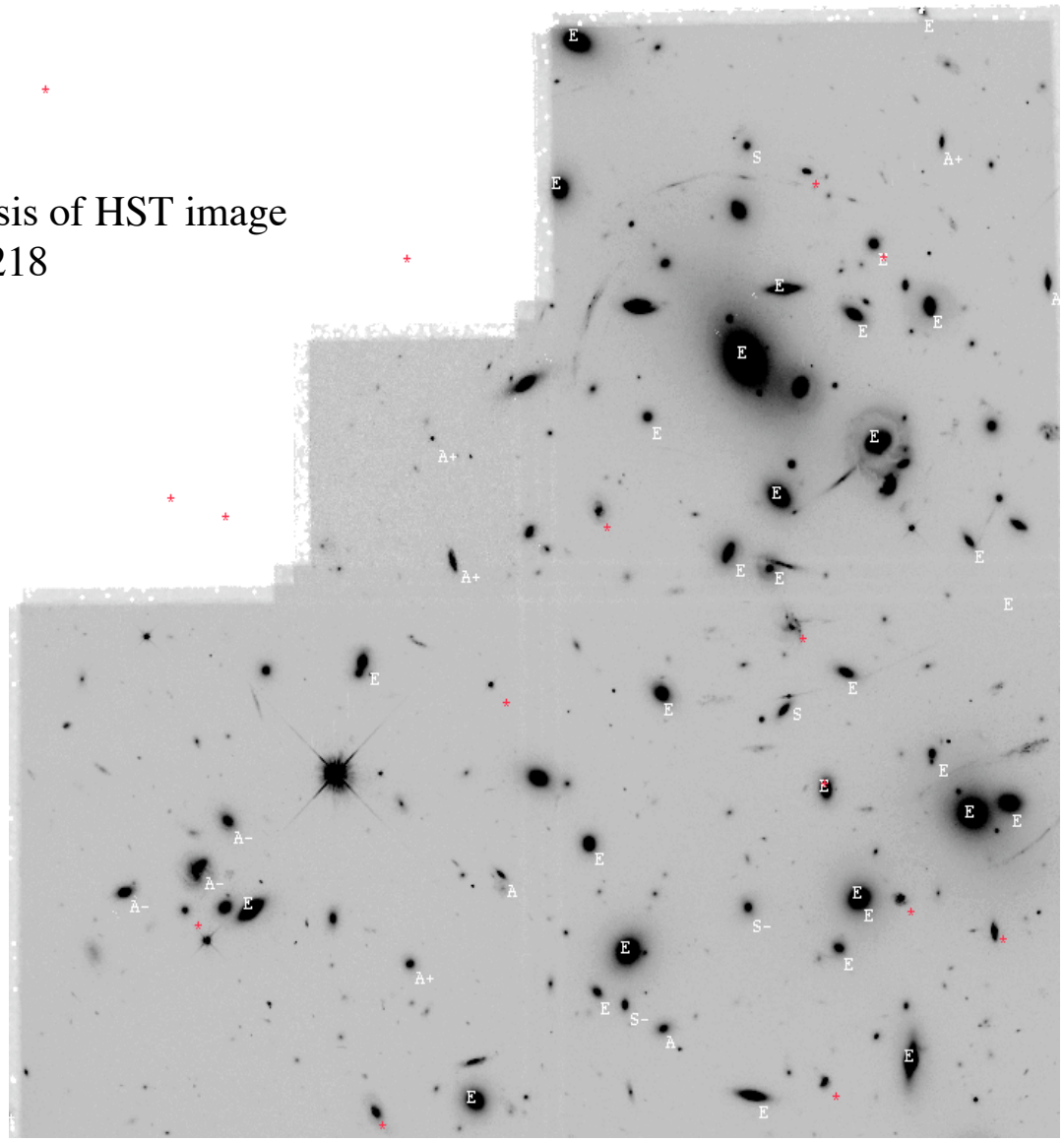
Examples: 2MASS (red) vs Archangel (blue)



Edge-on galaxy



Analysis of HST image
in A2218



Philosophical Points:

- Package covers a range of science tools: from detailed analysis of single galaxies to batch processing of large numbers (or many per field)
- Web search tool allows user to automatically find other wavelength data through NED
- Project aims to avoid methodism (von Clausewitz, 1814) through extensive play testing with undergrads
- Detailed documentation and cookbooks aimed at grad students and/or non-optical astronomers
- Python plus PGPLOT graphics allows the general astronomy user a fast learning curve to develop their own analysis tools and produce publication quality plots
- Python try/except structure allows fall-through, particularly advantageous for irregular shaped galaxies